Getting Started with the NI PXI/PCIe-8231

The NI PXI/PCIe-8231 (NI 8231) is a Gigabit Ethernet (GigE) interface device for the PXI, PCI Express (PCIe), or CompactPCI bus. This document describes how to install and configure the necessary hardware and software components to begin using the NI 8231.

What You Need to Get Started

You need the following items to set up and use the NI 8231.

- ❑ NI 8231 GigE interface device
- ❑ GigE Vision Camera
- ❑ Ethernet cable
- ❑ PXI, PCIe, or CompactPCI computer running Microsoft Windows Vista/2000/XP with at least one available slot

Note Visit `ni.com/info` and enter `rdvisionvista` for more information about National Instruments interface device compatibility with Windows Vista.

- ❑ NI Vision Acquisition Software 8.2.1 or later, which includes the NI-IMAQdx driver software
- ❑ Optional software for developing applications:
  - NI Vision Builder for Automated Inspection
  - NI Vision Development Module
  - LabVIEW
  - LabWindows™/CVI™
  - Microsoft Visual Basic

Related Documentation

The following documents contain additional information that you may find helpful:

- *NI Vision Acquisition Software Release Notes*—Outlines new functionality, system requirements, installation procedures, and descriptions of the documentation included with the NI-IMAQdx driver software.
- *Measurement & Automation Explorer Help for NI-IMAQdx*—Describes how to configure the NI-IMAQdx driver software, NI interface devices, and cameras using Measurement & Automation Explorer (MAX).
- *NI-IMAQdx User Manual*—Contains fundamental programming concepts for the NI-IMAQdx driver software

Safety Information

Caution The following paragraphs contain important safety information you *must* follow when installing and operating the device.

Do *not* operate the device in a manner not specified in the documentation. Misuse of the device may result in a hazard and may compromise the safety protection built into the device. If the device is damaged, turn it off and do *not* use it until service-trained personnel can check its safety. If necessary, return the device to National Instruments for repair.

Keep away from live circuits. Do *not* remove equipment covers or shields unless you are trained to do so. If signal wires are connected to the device, hazardous voltages can exist even when the equipment is turned off. To avoid a shock hazard, do *not* perform procedures involving cover or shield removal unless you are qualified to do so. Disconnect all field power prior to removing covers or shields.

If the device is rated for use with hazardous voltages (>30 V_{rms}, 42.4 V_{pk}, or 60 V_{dc}), it may require a safety earth-ground connection wire. Refer to the device specifications for maximum voltage ratings.

Because of the danger of introducing additional hazards, do *not* install unauthorized parts or modify the device. Use the device only with the chassis, modules, accessories, and cables specified in the installation instructions. All covers and filler panels *must* be installed while operating the device.

Do *not* operate the device in an explosive atmosphere or where flammable gases or fumes may be present. Operate the device only at or below the pollution degree stated in the specifications. Pollution consists of any foreign matter—solid, liquid, or gas—that may reduce dielectric strength or surface resistivity. The following is a description of pollution degrees.

- Pollution Degree 1—No pollution or only dry, nonconductive pollution occurs. The pollution has no effect.
- Pollution Degree 2—Normally only nonconductive pollution occurs. Occasionally, nonconductive pollution becomes conductive because of condensation.
- Pollution Degree 3—Conductive pollution or dry, nonconductive pollution occurs. Nonconductive pollution becomes conductive because of condensation.

Clean the device and accessories by brushing off light dust with a soft, nonmetallic brush. Remove other contaminants with a stiff, nonmetallic brush. The unit *must* be completely dry and free from contaminants before returning it to service.

You *must* insulate signal connections for the maximum voltage for which the device is rated. Do *not* exceed the maximum ratings for the device. Remove power from signal lines before connection to or disconnection from the device.

Caution National Instruments measurement products may be classified as either Measurement Category I or II. Operate products at or below the Measurement Category level specified in the hardware specifications.

Measurement Category[1]: Measurement circuits are subjected to working voltages[2] and transient stresses (overvoltage) from the circuit to which they are connected during measurement or test. Measurement Category establishes standardized impulse withstand voltage levels that commonly occur

[1] Measurement Categories as defined in electrical safety standard IEC 61010-1.

[2] Working voltage is the highest rms value of an AC or DC voltage that can occur across any particular insulation.

in electrical distribution systems. The following is a description of Measurement (Installation[1]) Categories:

- Measurement Category I is for measurements performed on circuits *not* directly connected to the electrical distribution system referred to as MAINS[2] voltage. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.
- Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall outlet (e.g., 115 V for U.S. or 230 V for Europe). Examples of Measurement Category II are measurements performed on household appliances, portable tools, and similar products.
- Measurement Category III is for measurements performed in the building installation at the distribution level. This category refers to measurements on hard-wired equipment such as equipment in fixed installations, distribution boards, and circuit breakers. Other examples are wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and stationary motors with permanent connections to fixed installations.
- Measurement Category IV is for measurements performed at the primary electrical supply installation (<1,000 V). Examples include electricity meters and measurements on primary overcurrent protection devices and on ripple control units.

Unpacking

The NI 8231 ships in an antistatic package to prevent electrostatic discharge from damaging device components. To avoid such damage in handling the device, take the following precautions:

1. Ground yourself using a grounding strap or by touching a grounded object, such as the computer chassis.
2. Touch the antistatic package to a metal part of the computer chassis before removing the device from the package.

Caution *Never* touch the exposed pins of connectors.

3. Remove the device from the package and inspect it for loose components or any other signs of damage. Notify National Instruments if the device appears damaged in any way. Do *not* install a damaged device in the computer.

Store the NI 8231 in the antistatic package when not in use.

Installation

The following instructions are for general installation. Refer to the documentation provided by your computer manufacturer for specific instructions and warnings. Refer to the *Specifications* section for a list of the typical power requirements for the NI 8231.

[1] Measurement Category is also referred to as Installation Category.

[2] MAINS is defined as the (hazardous live) electrical supply system to which equipment is designed to be connected for the purpose of powering the equipment. Suitably rated measuring circuits may be connected to the MAINS for measuring purposes.

NI PXI-8231

1. Install the NI Vision Acquisition Software before installing the NI PXI-8231. Refer to the *NI Vision Acquisition Software Release Notes* for specific installation instructions.
2. Power off and unplug the PXI or CompactPCI chassis.

Caution To protect yourself from electrical hazards, the computer *must* remain unplugged until the installation is complete.

3. Choose an unused PXI or Compact PCI slot and remove the filler panel.
4. Touch a metal part of the chassis to discharge any static electricity that might be on your clothes or body. Static electricity can damage the device.
5. Insert the NI PXI-8231 into the selected slot. Use the injector/ejector handle to fully inject the device into place.
6. Secure the front panel of the NI PXI-8231 to the front panel mounting rails of the PXI or CompactPCI chassis.
7. Connect the Ethernet cable to your camera. Refer to your camera manufacturer documentation for specific instructions about how to connect the cable to your camera.
8. Connect the Ethernet cable to the RJ-45 connector on the NI PXI-8231 front panel.
9. Plug in and power on the PXI or CompactPCI chassis.

The NI PXI-8231 is installed and the camera is connected.

NI PCIe-8231

1. Install the NI Vision Acquisition Software before installing the NI PCIe-8231. Refer to the *NI Vision Acquisition Software Release Notes* for specific installation instructions.
2. Power off and unplug the computer.

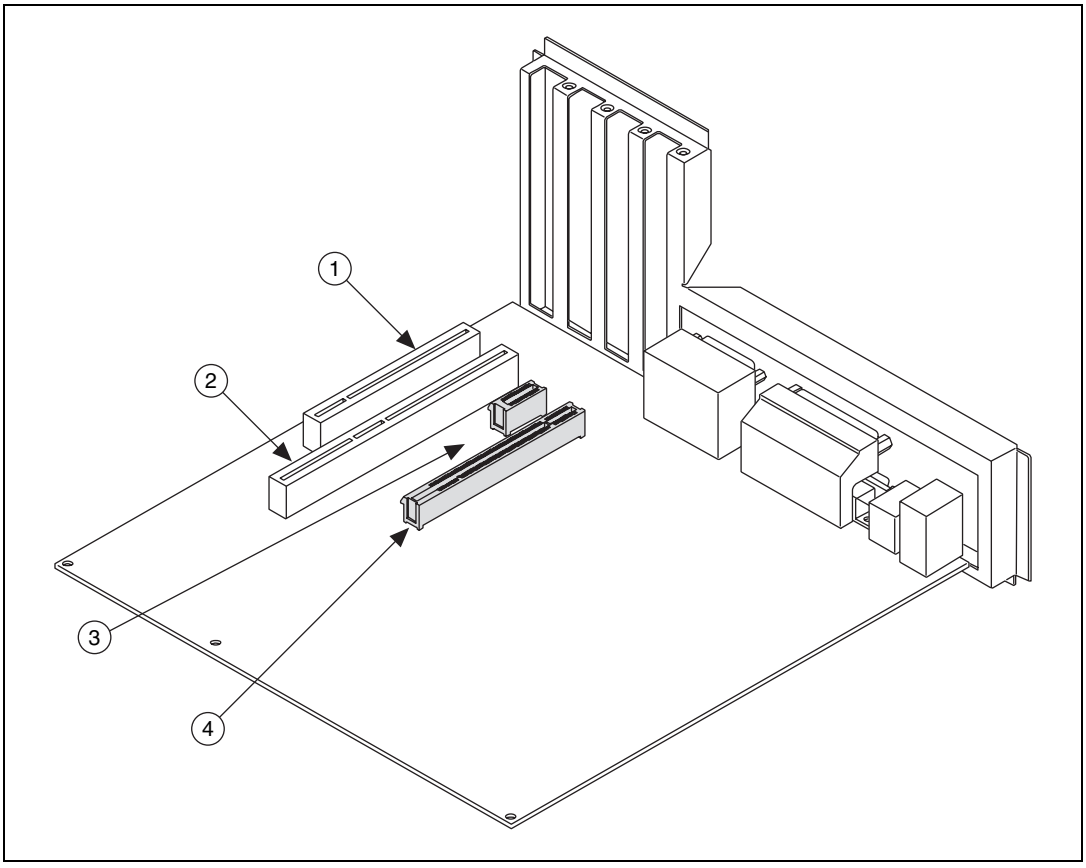
Caution To protect yourself and the computer from electrical hazards, the computer *must* remain unplugged until the installation is complete.

3. Remove the computer cover to expose the expansion slots.

Caution Installing a PCIe device into a PCI, PCI-X, AGP, or any non-PCIe slot can damage both the computer motherboard and the device. If you are unsure of the differences between the connector types, do *not* install the device. Refer to the documentation provided by your computer manufacturer to determine the correct slot in which to install the NI PCIe-8231.

4. Touch a metal part of the computer to discharge any static electricity that might be on your clothes or body. Static electricity can damage the device.
5. Choose an unused x1 or larger PCIe slot, and remove the corresponding expansion slot cover on the back panel of the computer. Figure 1 shows the different types of expansion slots available on most computers.

Note The NI PCIe-8231 is intended for a x1 PCIe slot. The NI PCIe-8231 will fit into, and can be used in, a x4, x8, or x16 PCIe slot.



1	PCI 32-bit Connector	3	PCIe x1 Connector
2	PCI 64-bit and/or PCI-X Connector	4	PCIe x16 Connector

Figure 1. PC Expansion Slots

6. Remove your device from the antistatic package and gently rock the device into the slot. The connection may be tight, but do *not* force the device into place.

Note Check that the bracket of your device lines up with the hole in the back panel rail of the computer chassis.

7. Secure the device mounting bracket to the back panel rail of the computer.
8. Replace the computer cover.
9. Connect the Ethernet cable to your camera. Refer to your camera manufacturer documentation for specific instructions about how to connect the cable to your camera.
10. Connect the Ethernet cable to the RJ-45 connector on the NI PCIe-8231 front panel.
11. Plug in and power on the computer.

The NI PCIe-8231 is now installed and the camera is connected.

Configuring the NI 8231

After you have installed the NI 8231 and powered on your computer, Windows will recognize the device and assign resources to it. Use Measurement & Automation Explorer (MAX), the National Instruments configuration utility, to configure a GigE Vision compliant camera, connected to the NI 8231, for acquisition. Refer to the *Measurement and Automation Explorer Help for NI-IMAQdx* for more information about how to configure the NI 8231.

Note Before configuring the device in MAX, ensure that you installed the NI-IMAQdx driver software

Specifications

The following specifications apply to the NI 8231 interface device. These specifications are typical at 25 °C, unless otherwise stated.

Physical Characteristics

Dimensions

NI PXI-8231 ..... 10.0 cm × 16.0 cm (3.9 in. × 6.3 in.)

NI PCIe-8231 ..... 12.9 cm × 12.0 cm (5.1 in. × 4.725 in.)

Camera Interface RJ-45

Weight

NI PXI-8231 ..... 140 g (4.9 oz)

NI PCIe-8231 ..... 70 g (2.5 oz)

Signaling

Ethernet ..... 1000Base-T compliant on four pairs of Category 5 cable

Power Requirements

NI PXI-8231

Typical ..... 788 mA at 3.3 V = 2.6 W maximum
1,330 mA at 3.3 V = 4.4 W maximum

NI PCIe-8231

Typical ..... 1 A at 3.3 V = 3.3 W maximum
375 mA at 3.3 V_{aux} = 1.24 W maximum

PCI Express Interface (NI PCIe-8231 Only)

PCI Express compliance ..... Version 1.1

Native link width x1

Up-plugging link width availability x4, x8, x16

Operating Environment

The NI 8231 is intended for indoor use only.

Ambient temperature range .....0 °C to 55 °C

Operating relative humidity

NI PXI-8231 .....10% to 90%, noncondensing

NI PCIe-8231.....50% to 85%, noncondensing

Pollution Degree 2

Caution Do *not* use the NI 8231 for connection to signals within Measurement Categories II, III, or IV.

Approved at altitudes up to 2,000 m.

Storage Environment

Ambient temperature range

NI PXI-8231 .....–20 °C to 70 °C

NI PCIe-8231.....–40 °C to 70 °C

Relative humidity

NI PXI-8231 .....5% to 95%, noncondensing

NI PCIe-8231.....50% to 85%, noncondensing

Safety

This product is designed to meet the requirements of the following standards of safety:

- IEC 60950-1, EN 60950-01
- UL 60950-1, CSA 60950-1

Electromagnetic Compatibility

This product is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:

- FCC Part 15—Radiated and Conducted Emissions (USA)
- ICES-003—Radiated and Conducted Emissions (Canada)
- CISPR 22—Radiated and Conducted Emissions (International)
- EN55022—Radiated and Conducted Emissions (European Union)
- EN55024—(Immunity) (European Union)
- VCCI—Radiated and Conducted Emissions (Japan)
- CNS13438—Radiated and Conducted Emissions (Taiwan)
- AS/NZS3548—Radiated and Conducted Emissions (Australia/New Zealand)
- MIC notice 1997-41, EMI and MIC notice 1997-42—EMS (Korea)

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 73/23/EEC; Low-Voltage Directive (safety)
- 89/336/EEC; Electromagnetic Compatibility Directive (EMC)

FCC Class B User Information

This equipment has been tested and found to comply with the limits for the class B digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to television or radio reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following means:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution If the device is changed or modified, the user may void his or her authority to operate the equipment.

Note This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of their life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit `ni.com/environment/weee.htm`.

Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At `ni.com/support` you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

A Declaration of Conformity (DoC) is our claim of compliance with the Council of the European Communities using the manufacturer's declaration of conformity. This system affords the user protection for electronic compatibility (EMC) and product safety. You can obtain the DoC for your product by visiting `ni.com/certification`. If your product supports calibration, you can obtain the calibration certificate for your product at `ni.com/calibration`.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at `ni.com/support` and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

Australia 1800 300 800, Austria 43 662 457990-0, Belgium 32 (0) 2 757 0020,
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Italy 39 02 413091, Japan 81 3 5472 2970, Korea 82 02 3451 3400, Lebanon 961 (0) 1 33 28 28,
Malaysia 1800 887710, Mexico 01 800 010 0793, Netherlands 31 (0) 348 433 466,
New Zealand 0800 553 322, Norway 47 (0) 66 90 76 60, Poland 48 22 3390150,
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